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BLOOD TRANSFUSION SERVICE IN YUGOSLAVIA

By Dr. Jerica Lah

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Following is the translation of an article by Dr. Jerica Lah in Vojnosanitetski Pregled (Military Medical and Pharmaceutical Review), Vol XVII, No 10, Belgrade, October 1960, pages 1035-39.⁷

Unification of the Transfusion Service and its Management.

The unification of the organization and work of our transfusion service is not prescribed by any Federal rule or law, and the separate Republics, with the exception of Slovenia, have created their own regulations. These regulations, however, are similar in their essentials. Furthermore, the basic cadres have passed through four institutes of the Republic for the purpose of perfecting their training, this contributing to some measure of uniformity in methodology. In the post-war period, especially since 1953, inter-Republic meetings have been held for the purpose of greater cooperation and unification, these meetings consisting either of experts from the Republican institutes for transfusion, or of a periodically formed commission on transfusion in FNRJ /Federal People's Republic of Yugoslavia/.

In order to unify and perfect the transfusion service, it is of foremost importance to form, or strengthen, the Federal commission and give support to its conclusions. This forum should include representatives of the Republican institutes for transfusion, the Yugoslav National Army, the Red Cross, civil defense, etc., as these have been listed above in the description of transfusion services of various countries. In addition, it is necessary to supplement the regulations, since it would appear that the Republican laws on medical service will only briefly formulate the existence of a transfusion service, the collection of blood from volunteers, the preparation of blood, and supervision of the work. It is also necessary to examine the eventual usefulness of a Yugoslav national institute for transfusion, and to give the Republican institutes greater powers for the supervision and execution of tasks necessary for the improvement of transfusion service in the Republic.

In working out national regulations on transfusion and the composition of the managerial body of our transfusion service, one must study the examples of many foreign countries: the US, Britain, the USSR, the eastern countries, France, and others.

The Yugoslav Red Cross, which took upon itself the task of collecting donors, must also have a strong central body which directs propaganda and introduces new ideas for acquiring donors, and unifies

the activity of mass organizations in this field.

The Network of Establishments for Transfusion.

Despite the lack of uniform legal directives the establishments for transfusion have up to the present developed into the following types:

1. Republican institutes for transfusion
2. Transfusion stations in larger hospitals
3. Transfusion sections in smaller hospitals, or in hospital departments.

Remark: Sections have the assignment of collecting blood solely for the use of the given hospital or department, and this primarily from relatives or friends of the patient. Stations, on the other hand, collect blood on a larger scale; in addition to the functions of the sections they also have the task of providing the equipment for transfusion and conducting research in the field of transfusion.

Establishments for transfusion of the station or section type exist in all Republics. Their numbers are as follows (the numbers in parentheses indicate establishments collecting more than 200 liters of blood annually):

Serbia	35 (12)	Bosnia and Herzegovina	4 (4)
Croatia	22 (14)	Macedonia	4 (2)
Slovenia	6 (6)	Montenegro	4 (0)

If we add to this number of establishments the 5 Republican institutes the total number of establishments for transfusion amounts to 80; in 1954 there were only 37.

For every 200,000 inhabitants of Yugoslavia there exists one establishment for transfusion. The results of the work of these stations would be better were they more evenly distributed and better supplied with personnel, materials and inventory. Meanwhile their distribution is uneven (Bosnia, Montenegro, southern Croatia, Macedonia, and part of Serbia, etc., have a very small number of establishments); the reporting service shows that the establishments include 20 which take blood only a few times a day and are managed like sections. Sometimes the term section is used to designate some insignificant, cramped and damp room which does not even have the most basic requirements for the reception of donors, not to mention for proper functioning.

For these reasons the Republics and the Federation must examine the whole network of these transfusion establishments in their totality. One must decide which establishments are first to be transformed into stations and how our modest means could best be channelled.

In Britain, for example, there exists one transfusion center for every 3 - 5 million inhabitants, which prepares and supplies the blood to all hospitals in its territory; in the Netherlands, too, there exists only one larger transfusion center which also works in the field, while smaller transfusion establishments are located near hospitals.

Since the equipment of establishments for transfusion, with the exception of institutes, no longer poses a problem -- it may be procured within the country -- the professional supervision can settle questions with regard to location and equipment of transfusion establishments; where the shortcomings are subjective in nature. Good preparation of materials and intravenous analysis should be centered in one to three establishments for transfusion in each Republic which has the necessary conditions for this.

The most urgent need is for the settlement of problems of location and equipment for the Republic institutes in Croatia, Bosnia and Herzegovina, and Montenegro, and for additional equipment for the taking of blood in all the Republics.

Amount of Blood collected, and Donors.

Establishments for transfusion collect annually, at the site of their location (within the establishments themselves) or in the field about 55,000 liters of blood, 7,000 liters of which is derived from members of the Yugoslav National Army with the help of either civilian or military equipment. Taking into account that an individual donor gives 350 ml. at each donation, this total represents 150,000 donations of blood from private citizens and 20,000 from members of the Yugoslav National Army. Actually these figures do not represent the number of donors: their number is smaller due to the fact that some of them donate blood two or three times a year, while the number of individuals registered is significantly larger, for 10 - 20% of candidates for donation of blood are rejected on medical grounds upon examination. The quantity of blood collected from private citizens in the Republics in recent years is as follows:

<u>People's Republic</u>	<u>Total</u>	<u>Quantity collected at the Republic's Institute</u>
Serbia	15,000 l.	6,500 l.
Croatia	13,000 l.	6,600 l.
Slovenia	13,000 l.	9,000 l.
Bosnia and Herze- govina	3,000 l.	1,400 l.
Macedonia	3,000 l.	2,500 l.
Montenegro	257 l.	

In the Republics the number of civilian inhabitants per one donor, or one donation of blood per year, as appropriate, is as follows:

Serbia	150	Macedonia	117
Croatia	140	Bosnia and Herzegovina	151
Slovenia	34	Montenegro	582

If we include donors from the Yugoslav National Army then one individual out of every 114 annually donates blood in Yugoslavia.

While in Yugoslavia one unit of donated blood consists of 350 ml., in foreign countries the unit usually amounts to 500 ml. In foreign literature one most frequently finds the belief that it is

necessary to effectuate at least two to three donations per year for every 100 inhabitants.

The figures for donors and units of blood collected in some foreign countries are as follows:

	<u>Units of Blood</u>	<u>One Donor per Number of Inhabitants</u>
Poland	100,000	240
Czechoslovakia	40,000	325
US	5,000,000	29
Britain	600,000	78
France	800,000	51
Italy	125,000	360
Switzerland	54,000	83
Netherlands	90,000	51
Belgium	47,000	118
West Germany	70,000	614
Austria	30,000	233

It is also important to consider the expenditure of blood per hospital bed. Excluding hospital beds in neuropsychiatric departments and those used in the treatment of mycosis, and if we deduct from the total quantity of blood collected in each Republic the amount that goes for the plasma program, the expenditures are as follows:

Serbia	391 ml.	Macedonia	467 ml.
Croatia	600 ml.	Bosnia and Herzegovina	361 ml.
Slovenia	1,301 ml.	Montenegro	127 ml.

In Yugoslavia the average amount of blood spent per hospital bed is 572 ml. In some hospitals the expenditure amounts to only 126 ml. per hospital bed, while in some clinics it rises as high as 4,000 ml. annually.

In foreign countries the expenditure of blood per hospital bed per year is as follows: in the USSR (including all types of hospital beds, even those in out-patient clinics) the average is regarded as 400 ml.; in Poland, 730 ml.; in Czechoslovakia, it is 1,750 ml. per surgical bed, 650 per medical bed; in U.S.A., excluding beds for contagious diseased and neuropsychiatric wards, 2,500 ml.; in Italy, 500 ml., etc.

Blood donors in Yugoslavia are not given remuneration as a rule. In 1959 almost all civilian donors in Bosnia and Herzegovina and in some transfusion establishments in southern Croatia received payment.

Donors are recruited by the medical personnel which comes in contact with the patient's family and convinces them that it is necessary to donate blood for the treatment of their sick member. Over 50% of the blood required in Serbia, Croatia and Macedonia, and 100% of blood utilized in Montenegro is obtained in this manner. In Slovenia this method of collecting blood is not necessary since the population donates blood extensively. Committees of the Red Cross generally collect blood by sending mobile equipment for the taking of blood to various localities, to a lesser extent in

transfusion sections in hospitals. Donors in garrisons are organized by the medical service of the Yugoslav National Army, sometimes jointly with the civilian propaganda service.

From all the facts presented above it is evident that the collection and expenditure of blood in the Republics must be made to balance the degree of development of the medical service. We believe that in Slovenia corresponding results have been achieved.

The taking of blood in Yugoslavia must be increased to twice a year, i.e. one must achieve the ratio of two or three donations of 350 ml. per year for every 100 inhabitants. In this manner over 100,000 l. of blood would be obtained, which would represent a sufficient amount for the improvement of expenditure of blood per hospital bed, as well as provide sufficient blood for the delivery of stable constituents of blood.

For the acquisition of larger quantities of blood, the following measures are necessary: One must activate for the recruitment of blood donors along with the Red Cross and the medical service, which together were the carriers of this assignment, also the mass organizations (in addition to the Federation of Fighters and some physical culture organizations which have already expressed their willingness, the Socialist Federation, syndical organizations, women's associations, etc.). The Red Cross -- despite the fact that many of their srez committees have achieved enviable results in their recruitment of donors -- cannot reach the desired results working in isolation. The medical service, health councils and health centers must show greater interest in the procurement of blood and must give attention to the harmful effects of remuneration of professional donors in hospitals (payments for blood entices donors to give blood too frequently, which is both inhumane and poor medical practise.) Propaganda for blood donations within the Yugoslav National Army must be made more uniform, since figures for some of the recent years indicate the donations to be uneven within the separate military authorities. The taking of blood in the field must be strengthened by means of adequate equipment and the medical service must check any improvisation in this regard.

Taking into account the particularity of our country the utilization of blood from corpses, after the example of experiences in the USSR, is a matter for discussion. Derivation of blood from placentas is of minor importance, due to the small quantities and the greater risk of the eventual sensitization of the recipient. This type of blood collection can only be organized in larger maternity wards.

Financial means for propagandizing blood donations must be a cooperative undertaking: the donation of blood represents not only definite health education, but has also the character of a preventive measure, the donors being given clinical and laboratory examinations, their eventual illnesses being pointed out, their blood groups and blood factors being determined, etc. For propaganda purposes, as is done in all countries, we must use various pamphlets, displays, marks

of acknowledgement, films, slides, etc. For this reason the medical service and financial organs must closely inspect the question of supplements for propaganda expenditures: it should not be left to the financial initiative of some of the transfusion establishments. In the propaganda for recruitment, donors are much disturbed by the idea of "their blood being sold" by the transfusion establishments to the hospitals, while in reality this only represents reimbursement for overhead expenses, including propaganda costs, and it is therefore necessary that the price of blood be examined outside the model of finances.

The large differences in expenditure of blood among the various establishments point either to insufficient supply or economy in the usage of blood on the one hand, or to abundant, and perhaps extravagant, use of blood on the other. There must, therefore, be more discussion of and more instruction on the indications for giving blood; at the same time one must also direct attention to the application of blood substitutes and isolated constituents of blood.

Separation of Blood Elements.

Today it is possible to separate and apply, depending on indications, blood cell elements (erythrocytes, thrombocytes) and blood plasma. Blood plasma may be preserved for shorter periods of time in liquid state, up to five years in dehydrated form. From plasma we isolate very stable constituents (albumin, gamma globulin, fibrinogen, thrombin, fibrinogen foam, anti-hemophilic plasma). Whereas erythrocytes, liquid blood plasma, and, to some degree, anti-hemophilic plasma can be prepared in all institutes and in some of the better equipped stations; the production of the remaining products requires expensive equipment, of which there exists only one in the country.

The production of dehydrated plasma is at present well established and depends on the quantity of blood collected, all Republics contributing for this purpose. The quantities of gamma globulin produced and utilized increase every year by about 10,000 l., the present expenditure thus amounting to over 50,000 l. The production of albumin is also on the increase, amounting to about 100,000 l. per year. The production or application, as appropriate, of these modern constituents of blood is not sufficient, despite the fact that the equipment has the capacity to produce more. Their insufficient application is the result of deficient knowledge of these products.

More attention should be given to the "plasma program". With adequate quantities of collected blood one must make full use of the capacity of the equipment and one must more strongly propagate their advantages for storage and application. Countries with advanced transfusion services have long ago recognized their usefulness, especially as regards to stocking in case of large requirements. Let us mention that in such countries as Britain, the US and the Netherlands they are continuously working on the dehydration of blood

products, and their published works reveal that their supplies are continuously replenished. In these countries research on the storage of these products is entrusted to the highest centers for blood transfusion.

Intravenous Substitutes for Plasma.

The problem of plasma substitutes can never be studied apart from that of blood products. In our country there are being conducted at present only various physiological-crystalloid analyses, often in a very primitive manner, while many Eastern and Western countries have a considerable choice of fairly good plasma substitutes which are of particular importance in case of mass injuries.

Personnel.

The high specialization of work in transfusion establishments requires trained and experienced personnel. Knowledge of transfusion, not only of its scientific aspects but also its practical foundations, has spread rapidly during the postwar period and we would err were we not to apply it in everyday practice. It is necessary that responsible positions in transfusion establishments be filled by physicians and graduates of secondary medical schools who have completed the corresponding courses on transfusion. Part of the personnel in establishments for transfusion must consist of specialists; it is only this year that transfusion has been aligned with the other branches of specialization. Today there are only 40 physicians working fulltime on transfusion in Yugoslavia; about 55 physicians are working parttime, while graduates of secondary medical schools number 190.

Courses on transfusion for physicians are organized in the Institute for Blood Transfusion of the People's Republic of Serbia; for secondary medical school personnel they are also offered in the Republic Institutes of Slovenia, Croatia and Macedonia. At present over 100 physicians and about 170 secondary medical school graduates have completed the courses.

The scarcity and loss of personnel in transfusion service is due to various unattractive features of transfusion (recruitment of donors, laboratory work, field work, insufficient remuneration, etc.). The wish for specialization which directed many physicians to the classic branches of medicine will cease to be a cause for loss of personnel upon the establishment of transfusion as a speciality.

In our opinion each station and every larger hospital should include a specialist on transfusion. It is already possible for many transfusion establishments to obtain proper hospital departments or compartments, i.e., the head of a station or section may participate on the professional staff of a hospital, receiving the same remuneration as the other departmental heads, etc. It is necessary to draw up regulations prescribing the specific training required for personnel in the various responsible positions and functions in work

on transfusion. Plans for the further improvement of personnel or, on the other hand, planning for the acquisition of the needed personnel, must be studied by the health councils, jointly with civil defense and the Yugoslav National Army. One must determine how transfusion personnel could be made available in a given situation. As regards instruction, it will not be difficult to strengthen instruction on transfusion in secondary medical schools; for physicians one must foresee instruction in transfusion as part of post-graduate training, i.e. in full medical standing.

Methodology and Research in Transfusion.

Basic work methods in transfusion establishments and control of products are prescribed in official instructions published in the newspaper National Health, No 1 - 2, 1957 (e.g., examination of donors, preparation of equipment and products for transfusion, characteristics and control of plasma and fractions of plasma, etc.) One might state that working methods are, in so far as this does not depend on poor conditions and personnel, uniform over the whole country; it is a fact, however, that the rules listed are little respected and that they should be given greater legality by means of a new pharmacopoeia.

Proper preparation of transfusion equipment is rather neglected, particularly in the smaller transfusion establishments, due more to financial economizing than to lack of knowledge. The institutes strive to prepare transfusion instruments and bottles of preserves for those transfusion establishments which lack facilities for this work. Institutes in Belgrade and Ljubljana are striving for the earliest possible introduction of the use of plastic containers for single applications, such as have been in use for years in Western countries.

Our goal is the standardization of the type of transfusion equipment and the quality of materials used in the preparation of these articles (glass, rubber, metals, plastics). Our institutes for transfusion have, with the help of experts from relevant factories, already been cooperating for some years with the FNRJ Commission on Standardization, and through it with the International Committee on Standardization. In this connection it is necessary to decide whether our country shall become a member of this committee or remain, as heretofore, merely an observer.

Over 350 liters of various test sera for blood groups, factors, etc., are being manufactured in our country, primarily in the institutes for transfusion. The production of test sera is considered to be significantly below the required demand, especially as regards the creation of a stock. This problem should not be solved by having all transfusion establishments prepare test sera; this work is to be left to the Republic institutes, the transfusion establishments cooperating in discovering suitable blood for the preparation of test sera.

The Federal Secretariat for Internal Affairs has approved the

recording of blood groups on personal identification cards. This is the first step toward mass assignment of blood groups to the population. Up to the present the recording of blood groups pertains only to those obtained in the obligatory examination given to donors and recipients on occasion of taking and giving blood. Meanwhile one must settle as early as possible the question whether the institutes for social security are obligated to carry the cost of determination of blood groups for their insured members who seek blood typing on their own initiative, and individually, in transfusion establishments, or for members of larger collectives who work in dangerous occupations (in mines, foundries, railroads, etc.) Financial means will not be available for a long time to come for a wider, mass determination of blood groups. The Republic institutes have the duty to bring a decision as to which transfusion establishments of a given Republic will be given authority to record blood groups in personal identification cards and what method is to be used for blood typing, it often being the case that blood groups are determined in a very superficial manner.

In order to improve working methods and research, one must expedite the development of as large a number of well trained personnel as possible; next one must work out a program of specialization, maintain professional supervision, provide instruction and publish manuals on everyday work, etc.

To research on the application of blood products to patients must be added a system of organization; our transfusion establishments, particularly the institutes, differ in this respect from institutions in foreign countries. In Eastern countries transfusion institutes are either connected with clinical departments or themselves possess hospital beds. In the West, regional institutes are linked through their personnel with medical faculties or transfusion institutes are connected with the national research council. In our country cooperation for the purpose of research is left to individual initiative and to the interest of clinical experts and specialists of institutes.

Research on improving methodology is being carried out only in the Republic institutes. The reason for this is simple: only the institutes maintain a larger full-time staff and only they can afford to allocate modest financial resources for various research projects. Conclusive research work, which is of great importance in the solution of problems of transfusion, must in future be systematically planned, and for this purpose allocation of financial aid outside of independent sources is necessary.

Research work must, at least in part, be given definite direction; we are in need of research on materials for transfusion equipment, on improvement of the production of test sera, on substitutes for blood plasma, on the improvement of preservation of all blood constituents, on the study of new blood fractions, on the blood groups of the population, coagulations factors connected with preservation, various immuno-hematological and biochemical investigations of blood, etc.

In conclusion we might state that many problems of our transfusion service demand immediate solution and that the solutions of these questions lies outside the sphere of activity of the transfusion service, which thus far has achieved much in the adoption of modern principles. Delay in the solution of at least the significant problems is a hindrance to the progressive development of this service, which should be equipped for fast and effective aid, not only in time of peace, but also in case of mass injury.

Work accepted 9 June 1959.